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(54) **SYSTEM OF FASTENING GASTRIC SLEEVES**

(56) **References Cited**

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U.S. PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 625 days.

3,867,944	A *	2/1975	Samuels	606/158
5,242,456	A *	9/1993	Nash et al.	606/142
5,620,452	A	4/1997	Yoon	
2004/0097989	A1	5/2004	Molina Trigueros	
2006/0235469	A1 *	10/2006	Viola	606/219
2007/0118163	A1	5/2007	Boudreaux et al.	
2008/0319456	A1 *	12/2008	Hart	606/142

(Continued)

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FOREIGN PATENT DOCUMENTS

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US 2012/0245605 A1 Sep. 27, 2012

OTHER PUBLICATIONS

PCT International Search Report and Written Opinion of the International Searching Authority for related PCT/US2012/30154, dated Dec. 7, 2012, 9 pages.

(Continued)

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(52) **U.S. Cl.**

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(58) **Field of Classification Search**

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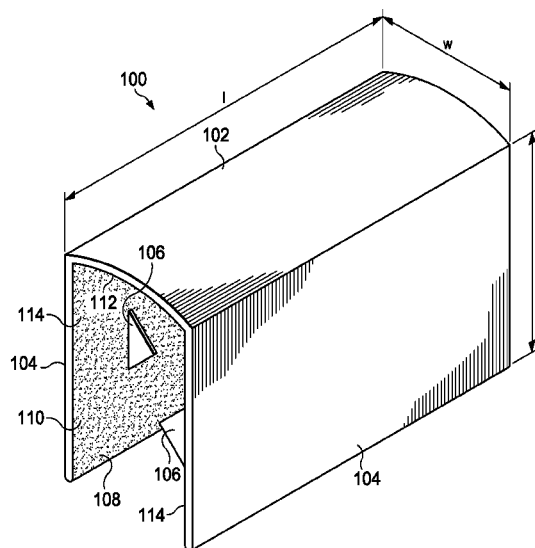
USPC 606/142, 151, 139, 140, 141, 143, 157, 606/213, 214, 215

See application file for complete search history.

(57) **ABSTRACT**

A surgical clip comprising a curved backbone having a lower side, a plurality of arms coupled to the curved backbone and extending therefrom in the same direction, each arm having a facing side, and an interior surface comprising the lower side of the curved backbone and the facing sides of the plurality of arms. A method of installing a surgical clip comprising fastening body tissue with surgical staples to form a stapled edge, and fastening the surgical clip across the stapled edge to inhibit the development of openings along the stapled edge. A tool for installing a surgical clip, the tool comprising a clip delivery end to carry and position the surgical clip, and an actuator to cause the surgical clip to engage and secure the stapled edge of body tissue.

16 Claims, 6 Drawing Sheets



(56)

References Cited

OTHER PUBLICATIONS

U.S. PATENT DOCUMENTS

2009/0065551 A1* 3/2009 Green et al. 227/176.1
2010/0204728 A1* 8/2010 Bettuchi 606/213

PCT International Preliminary Report on Patentability for related
PCT/US2012/30154, dated Oct. 3, 2013, 8 pages.

* cited by examiner

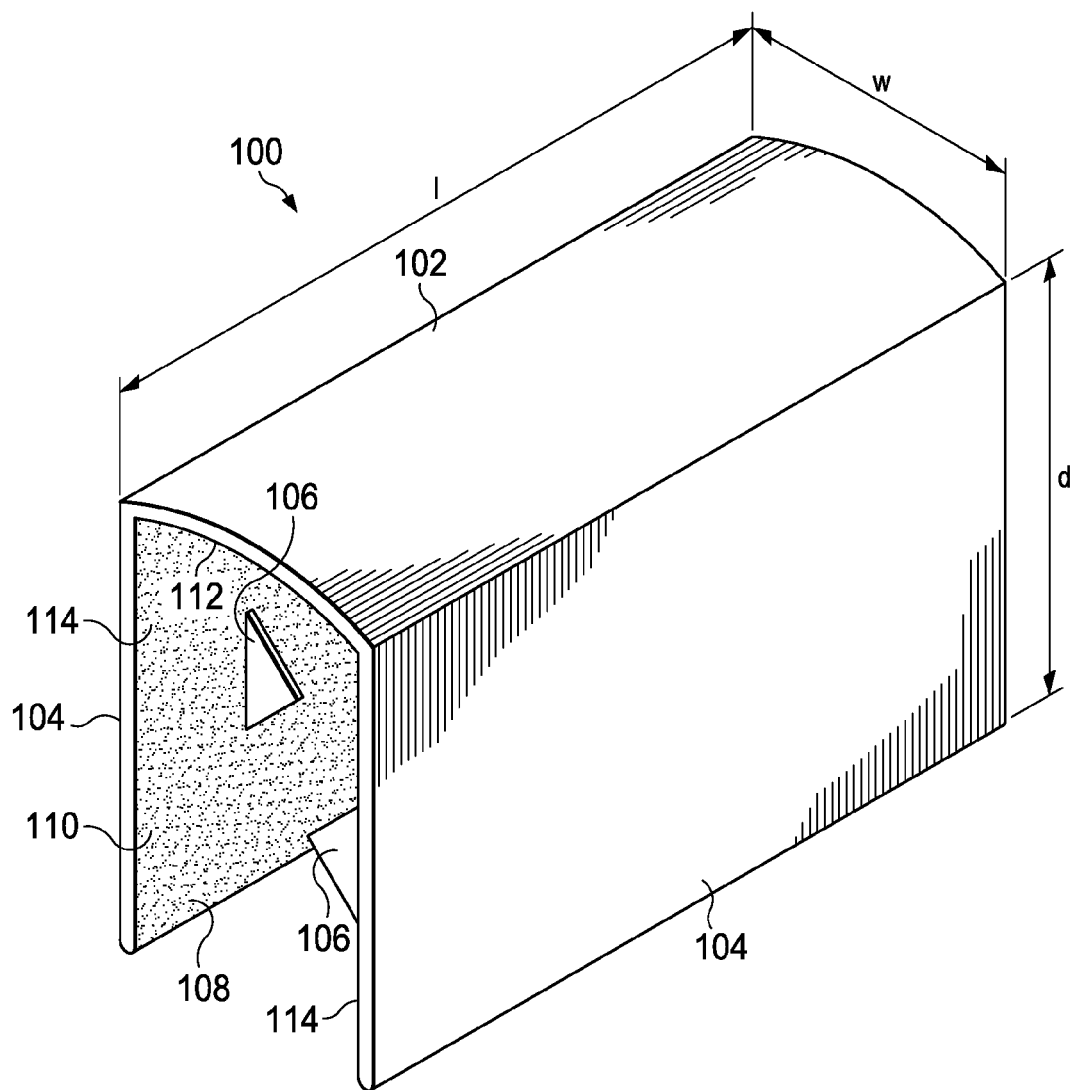
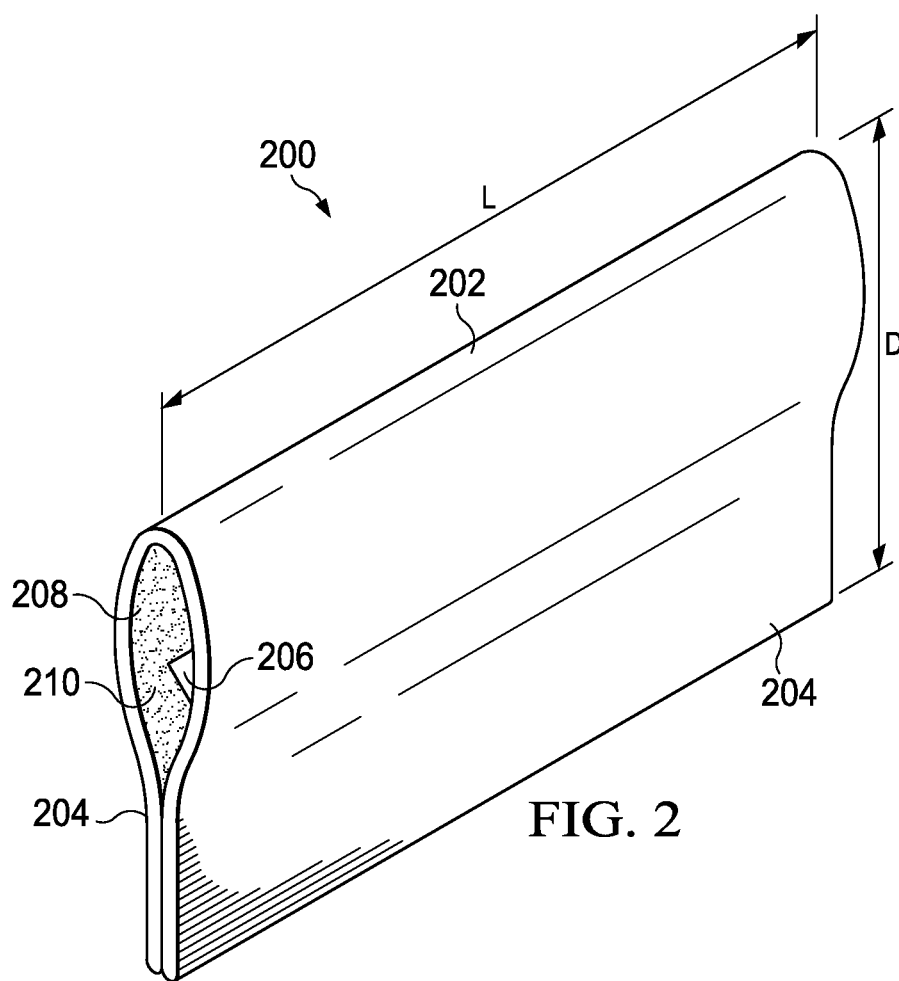
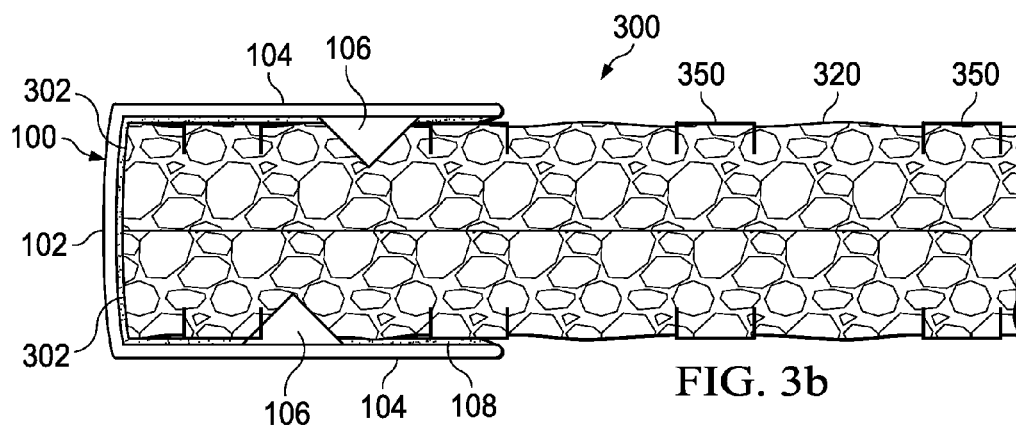
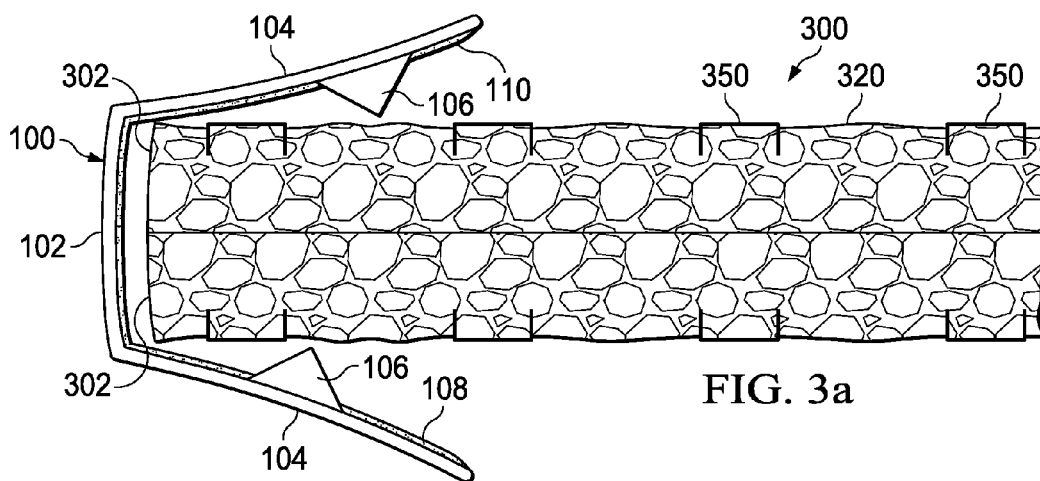


FIG. 1





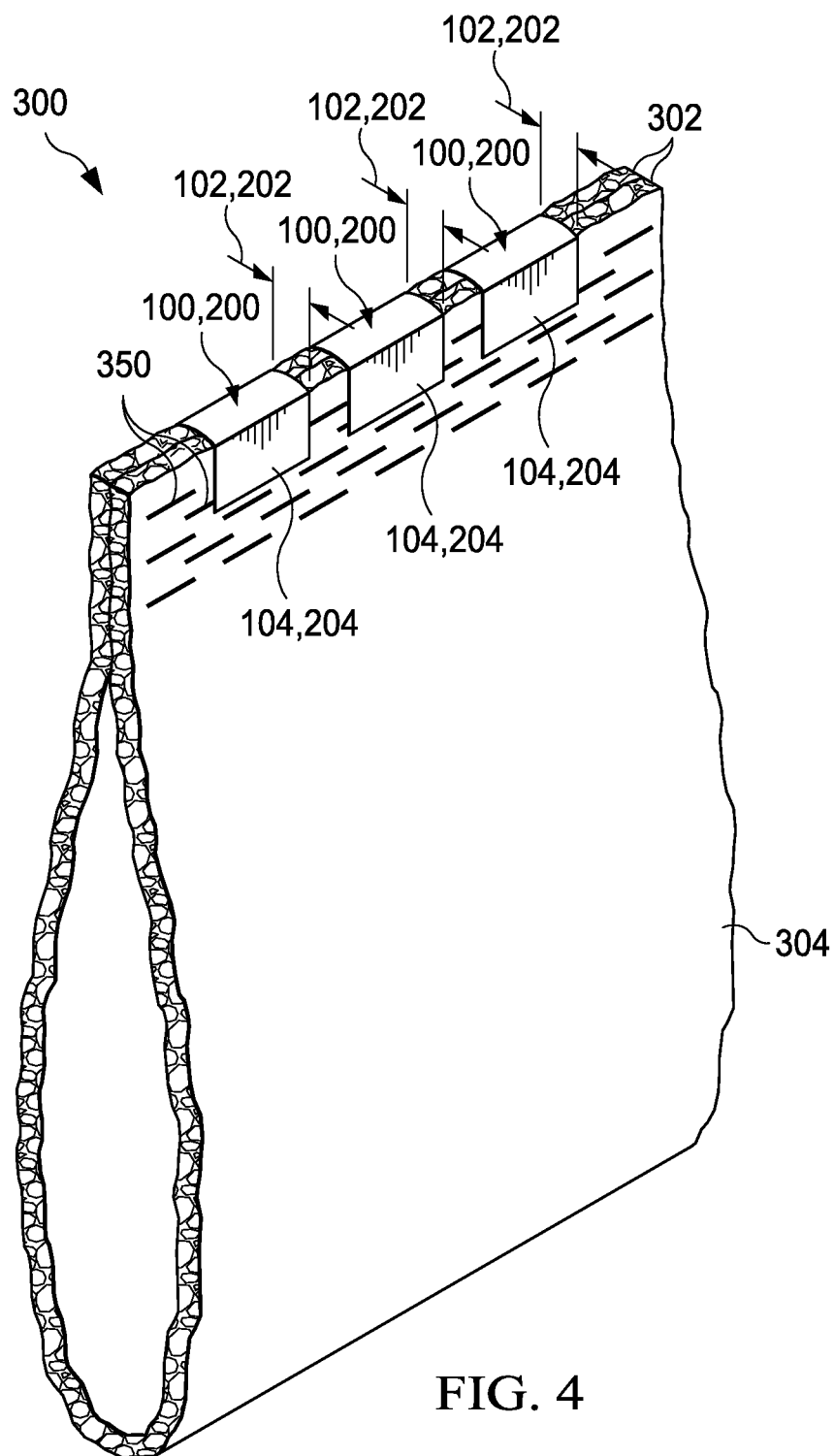
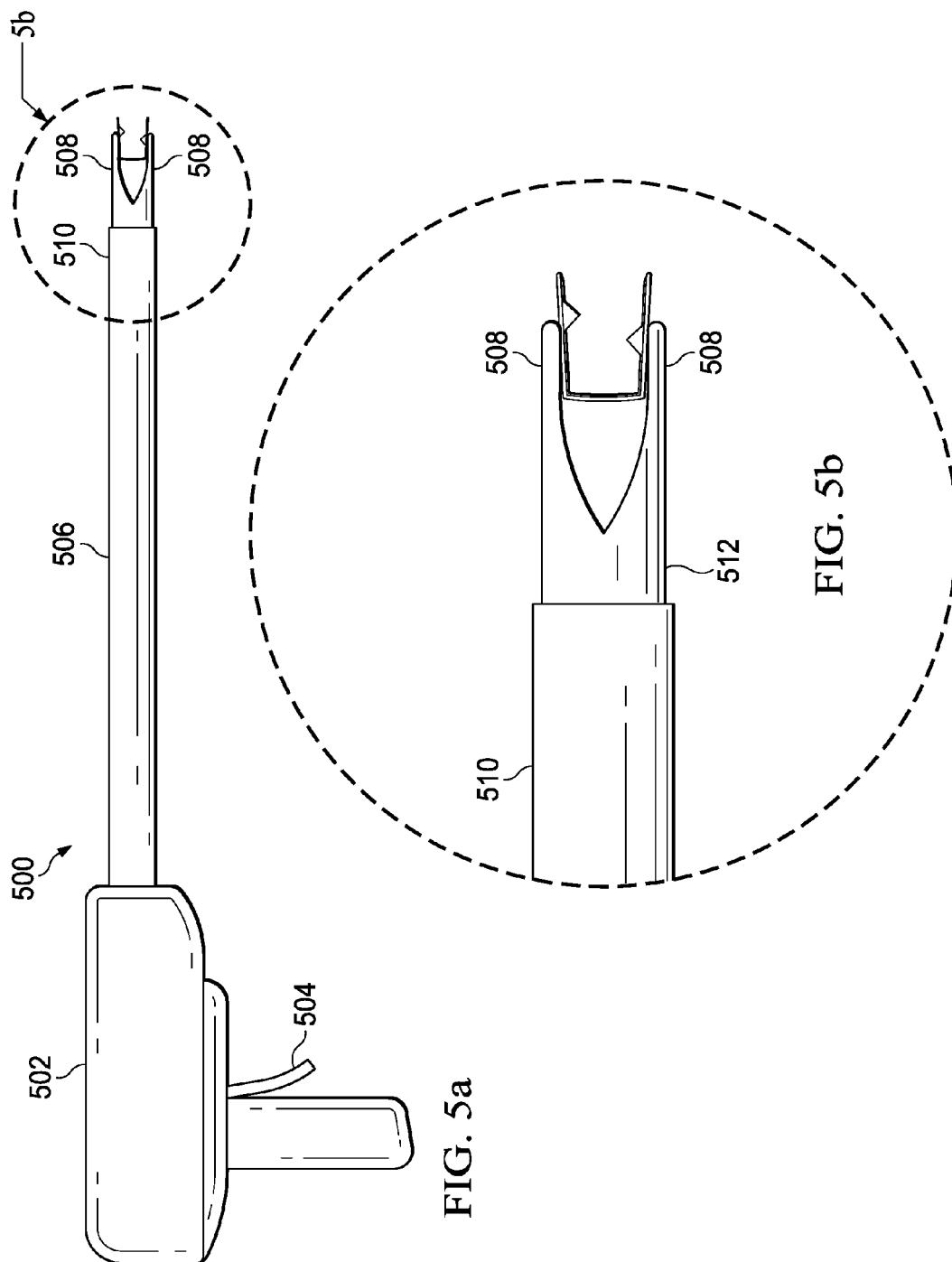


FIG. 4



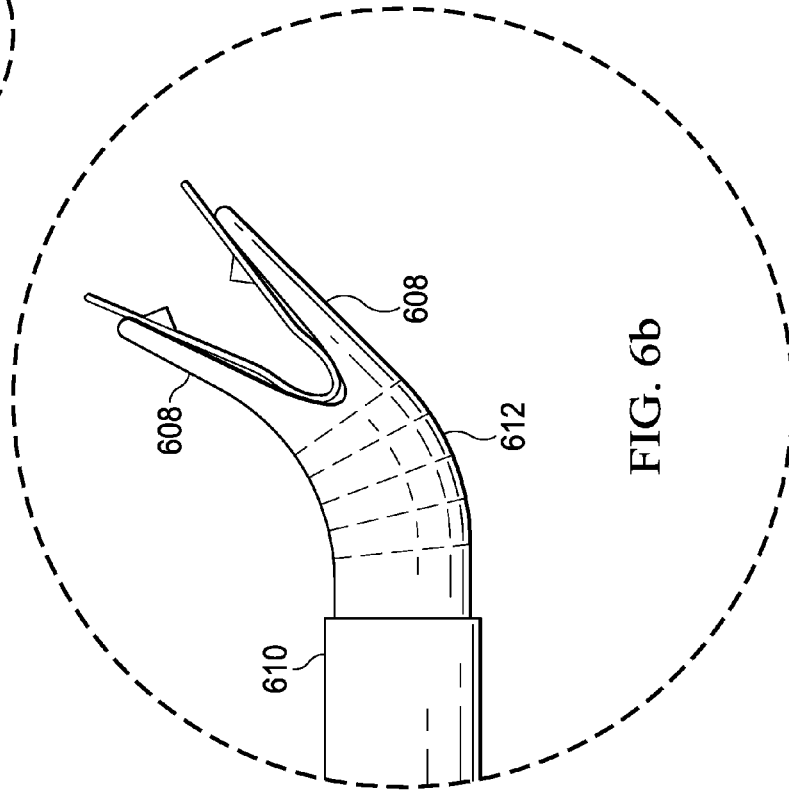
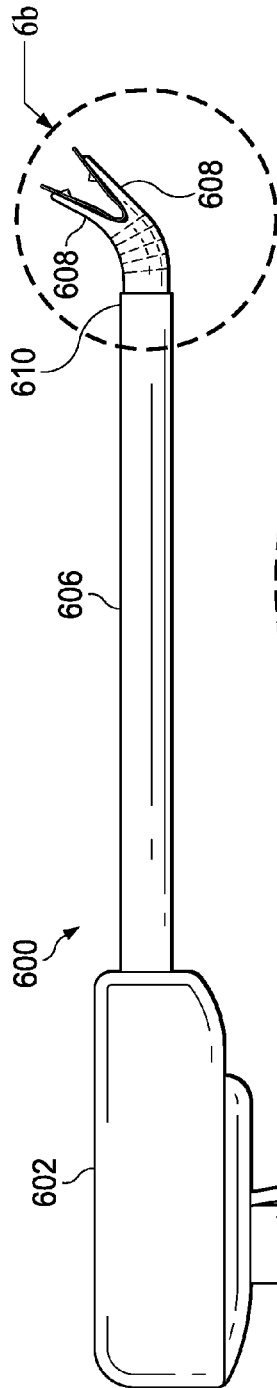


FIG. 6a

FIG. 6b

SYSTEM OF FASTENING GASTRIC SLEEVES**CROSS REFERENCE TO RELATED APPLICATIONS**

The present application claims the benefit under 35 U.S.C. §119(e) of U.S. Provisional Patent Application Ser. No. 61/466,130 filed Mar. 22, 2011 and entitled "System of Fastening Gastric Sleeves," which is incorporated herein by reference for all purposes.

TECHNICAL FIELD

The present disclosure relates generally to systems and methods of fastening a gastric sleeve to substantially prevent leakage of gastric fluid into the abdominal cavity, and more particularly, to a surgical clip that inhibits the development of holes and gaps along a stapled edge of a gastric sleeve.

BACKGROUND

During gastric sleeve surgery (sleeve gastrectomy), a portion of the stomach is removed, and the open edges of the stomach tissue are then attached together using multiple rows of surgical staples to form a gastric sleeve. After surgery, and as the body moves, holes or gaps may develop along the stapled edge of the gastric sleeve, thereby allowing gastric fluid to leak into the abdominal cavity, which can lead to life threatening complications. Bacteria from gastric contents can cause a severe infection in the abdominal cavity that may result in sepsis or septic shock, which can eventually lead to multiple organ failure and even death.

SUMMARY

Embodiments of the present disclosure generally provide systems and methods for fastening a gastric sleeve to inhibit the development of holes or gaps along the stapled edge of the gastric sleeve and thereby substantially prevent leakage of gastric fluid into the abdominal cavity.

In an embodiment, the present disclosure provides a surgical clip comprising a curved backbone having a length and a width, and two arms each having a depth. The surgical clip may comprise one or more grippable prong components. The surgical clip may further comprise reinforced adhesive material disposed on an interior surface thereof. In an embodiment, the surgical clip is crimpable. In another embodiment, the surgical clip is a spring memory clip.

In another embodiment, the present disclosure provides a surgical clip comprising a curved backbone having a lower side, a plurality of arms coupled to the curved backbone and extending therefrom in the same direction, each arm having a facing side, and an interior surface comprising the lower side of the curved backbone and the facing sides of the plurality of arms. The surgical clip may further comprise a plurality of grippable prongs disposed along the interior surface. The surgical clip may further comprise reinforced adhesive material disposed along the interior surface. In an embodiment, the surgical clip is crimpable to engage and secure body tissue. In another embodiment, each of the plurality of arms of the surgical clip is spring loaded and biased in a closed position.

In an embodiment, the present disclosure provides a method for fastening a gastric sleeve comprising installing a surgical clip along a length of the stapled edge of the gastric sleeve to reinforce the closure formed by the stapled edge.

In another embodiment, the present disclosure provides a method for fastening a gastric sleeve comprising installing a

surgical clip across one or more rows of staples along a depth of the stapled edge of the gastric sleeve.

In another embodiment, the present disclosure provides a method for installing a surgical clip comprising disposing the surgical clip in a disengaged position over open edges of stomach tissue along the stapled edge of the gastric sleeve and closing the surgical clip around the open edges of stomach tissue into engagement with the stapled edge of the gastric sleeve. In an embodiment, closing the surgical clip comprises crimping the surgical clip. In another embodiment, closing the surgical clip comprises releasing a spring memory clip.

In another embodiment, the present disclosure provides a method of installing a surgical clip comprising fastening body tissue with surgical staples to form a stapled edge, and fastening the surgical clip across the stapled edge to inhibit the development of openings along the stapled edge. The method may further comprise positioning the curved backbone around open edges of body tissue along the stapled edge before fastening the surgical clip across the stapled edge. The method may further comprise extending the plurality of arms over one or more rows of surgical staples forming the stapled edge before fastening the surgical clip across the stapled edge. In an embodiment, the method further comprises gripping the body tissue forming the stapled edge with grippable prongs disposed along an interior surface of the surgical clip. The method may further comprise adhering the surgical clip to the stapled edge.

In another embodiment, the present disclosure provides a method of installing a surgical clip comprising positioning the surgical clip along a stapled edge of body tissue, engaging the stapled edge of body tissue with the plurality of arms, and crimping the surgical clip to secure the stapled edge of body tissue. The method may further comprise gripping the body tissue forming the stapled edge with grippable prongs disposed along an interior surface of the surgical clip.

In another embodiment, the present disclosure provides a method of installing a surgical clip comprising forcing open the spring loaded arms of the surgical clip, positioning the surgical clip along a stapled edge of body tissue, and releasing the spring loaded arms to engage and secure the stapled edge of body tissue. The method may further comprise gripping the body tissue forming the stapled edge with grippable prongs disposed along an interior surface of the surgical clip.

In an embodiment, the present disclosure provides a surgical clip applicator for installing the surgical clip to the gastric sleeve. In an embodiment, the surgical clip applicator comprises a clip delivery end with a stationary axis. In another embodiment, the surgical clip applicator comprises a clip delivery end with a rotatable axis.

In another embodiment, the present disclosure provides a tool for installing a surgical clip comprising a clip delivery end to carry and position the surgical clip; and an actuator to cause the surgical clip to engage and secure the stapled edge of body tissue. In an embodiment, the actuator causes the clip to be crimped. In another embodiment, the actuator releases the clip to a closed position. The tool may further comprise a handle, a trocar coupled to the handle and coupled to the clip delivery end, and jaws coupled to the clip delivery end, wherein a plurality of surgical clips are loaded through the handle into the trocar, and a surgical clip is conveyed through the clip delivery end to the jaws. In an embodiment, the clip delivery end has a stationary axis. In another embodiment, the clip delivery end has a rotatable axis.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present disclosure and its features, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

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FIG. 1 is an exemplary illustration of a crimpable surgical clip in accordance with one embodiment of the present disclosure;

FIG. 2 is an exemplary illustration of a spring memory surgical clip in accordance with one embodiment of the present disclosure;

FIG. 3a is a side view of the surgical clip of FIG. 1 in a disengaged position while being positioned over open edges of stomach tissue along the stapled edge of the gastric sleeve in accordance with one embodiment of the present disclosure;

FIG. 3b is a side view of the surgical clip of FIG. 1 in an engaged or crimped position to fasten the open edges of stomach tissue together in accordance with one embodiment of the present disclosure;

FIG. 4 is an exemplary illustration of a gastric sleeve with a plurality of surgical clips installed in accordance with one embodiment of the present disclosure;

FIG. 5a is an exemplary illustration of a surgical clip applicator used to install the surgical clip of FIG. 1 in accordance with one embodiment of the present disclosure;

FIG. 5b is an enlarged illustration of the clip delivery end of the surgical clip applicator of FIG. 5a, the clip delivery end having a stationary axis in accordance with one embodiment of the present disclosure;

FIG. 6a is an exemplary illustration of a surgical clip applicator used to install the surgical clips of FIG. 1 in accordance with one embodiment of the present disclosure; and

FIG. 6b is an enlarged illustration of the clip delivery end of the surgical clip applicator of FIG. 6a, the clip delivery end having a rotatable axis in accordance with one embodiment of the present disclosure.

DETAILED DESCRIPTION

The present disclosure generally provides systems and methods for fastening gastric sleeves to inhibit the development of holes or gaps along the stapled edge of the gastric sleeve.

FIG. 1 illustrates a gastric sleeve fastening system comprising a crimpable surgical clip 100 according to an embodiment of the present disclosure. It should be understood that the crimpable surgical clip 100 shown in FIG. 1 is for illustrative purposes only and that any other suitable system or subsystem could be used in conjunction with, or in lieu of, crimpable surgical clip 100 according to one embodiment of the present disclosure.

According to an embodiment of the present disclosure, crimpable surgical clip 100 may comprise a curved backbone 102 and two arms 104 connected thereto. The interconnection between the curved backbone 102 and the two arms 104 may be generally square-shaped, with each of the two arms 104 extending generally perpendicular to the curved backbone 102 as shown in FIG. 1. In other embodiments, the interconnection between the curved backbone 102 and the two arms 104 may be generally rounded and/or semi-circular in shape.

An interior surface 110 of the crimpable surgical clip 100 comprises the lower side 112 of the curved backbone 102 and the facing sides 114 of each of the arms 104. In an embodiment, grippable prongs 106 may be provided along the interior surface 110 of the crimpable surgical clip 100. Optionally, a layer of reinforced adhesive material 108 may also be disposed along the interior surface 110 of the crimpable surgical clip 100.

In an embodiment, curved backbone 102 may have a width (w) measuring about 4 mm when in the open or disengaged position and a length (l) measuring about 1 cm. In an embodi-

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ment, each arm 104 may have a depth (d) measuring about 6 mm and a length (l) substantially the same as the curved backbone 102.

In an embodiment, one or more of curved backbone 102, arms 104, and grippable prongs 106 of the crimpable surgical clip 100 may be made of titanium, another suitable biocompatible medical grade material, or any combination thereof.

In an embodiment, reinforced adhesive material 108 may be employed to adhere the crimpable surgical clip 100 to the stomach tissue forming the gastric sleeve. Reinforced adhesive material 108 may be made of any suitable biocompatible medical grade adhesive material.

In operation, as described in more detail below, crimpable surgical clip 100 may be installed to fasten the open edges of stomach tissue along the stapled edge of the gastric sleeve according to one embodiment of the present disclosure. In particular, crimpable surgical clip 100 may be crimped such that the arms 104 engage the stomach tissue forming the stapled edge of the gastric sleeve. Grippable prongs 106 and reinforced adhesive material 108 may optionally be provided to further secure crimpable surgical clip 100 to the gastric sleeve and thereby inhibit the development of holes or gaps in the stapled edge of the gastric sleeve according to one embodiment of the present disclosure.

FIG. 2 generally illustrates another embodiment of a gastric sleeve fastening system comprising a spring memory surgical clip 200. It should be understood that the spring memory surgical clip 200 shown in FIG. 2 is for illustrative purposes only and that any other suitable system or subsystem could be used in conjunction with or in lieu of spring memory surgical clip 200 according to one embodiment of the present disclosure.

In one embodiment, spring memory surgical clip 200 could generally be similar to crimpable surgical clip 100 shown in and described in conjunction with FIG. 1 above (with like parts having similar numbers). As such, spring memory surgical clip 200 may comprise a curved backbone 202, two arms 204 connected thereto, and an interior surface 210. In contrast to the arms 104 of crimpable surgical clip 100, the arms 204 of clip 200 are spring-loaded and biased to a closed, engaging position as depicted in FIG. 2. In an embodiment, grippable prongs 206 may be provided along the interior surface 210 of the spring memory surgical clip 200. Optionally, a layer of reinforced adhesive material 208 may also be disposed along the interior surface 210 of the spring memory surgical clip 200.

In an embodiment, curved backbone 202 may have a length (L) measuring about 1 cm. Each arm 104 may have a depth (D) measuring about 6 mm and a length (L) substantially the same as the curved backbone 202.

In an embodiment, one or more of curved backbone 202, arms 204, and grippable prongs 206 of the spring memory surgical clip 200 may be made of titanium, another suitable biocompatible medical grade material, or any combination thereof.

In an embodiment, reinforced adhesive material 208 may be employed to adhere the spring memory surgical clip 200 to the stomach tissue forming the gastric sleeve. Reinforced adhesive material 208 may be made of any suitable biocompatible medical grade adhesive material.

In operation, as described in more detail below, spring memory surgical clip 200 may be installed to fasten the open edges of stomach tissue along the stapled edge of the gastric sleeve according to one embodiment of the present disclosure. In particular, the arms 204 of spring memory surgical clip 200 may be forced open for positioning with respect to the open edges of stomach tissue along the stapled edge and

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then released such that the arms **204** engage the stomach tissue forming the stapled edge of the gastric sleeve. Grippable prongs **206** and reinforced adhesive material **208** may optionally be provided to further secure spring memory surgical clip **200** to the gastric sleeve and thereby inhibit the development of holes or gaps in the stapled edge of the gastric sleeve according to one embodiment of the present disclosure.

FIG. **3a** depicts a side view of the crimpable surgical clip **100** of FIG. **1** in a disengaged position while being oriented for installation along a stapled edge **320** of a gastric sleeve **300** to fasten open edges **302** of stomach tissue together in accordance with one embodiment of the present disclosure. As depicted, the stapled edge **320** comprises a plurality of rows of staples **350** that form a closure for the gastric sleeve **300** while open edges **302** of stomach tissue remain. As depicted in FIG. **3a**, curved backbone **102** may be positioned around the open edges **302** of remaining stomach tissue such that the arms **104** extend over one or more rows of surgical staples **350**.

FIG. **3b** depicts a side view of the crimpable surgical clip **100** of FIG. **1** in the engaged or crimped position around the open edges **302** of stomach tissue, with the arms **104** extending across several rows of surgical staples **350** of the stapled edge **320** of gastric sleeve **300** in accordance with one embodiment of the present disclosure. In this configuration, the grippable prongs **106** may extend into the stomach tissue forming the stapled edge **320** of the gastric sleeve **300**, and the reinforced adhesive material **108** may adhere the crimpable surgical clip **100** to the staples **350** and/or the stomach tissue.

Still referring to FIGS. **3a** and **3b**, in one embodiment, spring memory surgical clip **200** may generally be installed in a manner similar to the crimpable surgical clip **100**. In particular, the arms **204** of spring memory surgical clip **200** may be forced open against the bias of the spring force to a disengaged position while being oriented for installation along a stapled edge **320** of a gastric sleeve **300** to fasten open edges **302** of stomach tissue together in accordance with one embodiment of the present disclosure. Similar to the configuration of the crimpable surgical clip **100** depicted in FIG. **3a**, curved backbone **202** may be positioned around the open edges **302** of remaining stomach tissue such that the arms **204** extend over one or more rows of surgical staples **350**.

In an embodiment, when the spring memory surgical clip **200** is oriented in the appropriate position for installation, the arms **204** may then be released to move to the engaged or closed position similar to the configuration of the crimpable surgical clip **100** depicted in FIG. **3b**. In the engaged position, the grippable prongs **206** may extend into the stomach tissue forming the stapled edge **320** of the gastric sleeve **300**, and the reinforced adhesive material **208** may adhere the spring memory surgical clip **200** to the staples **350** and/or the stomach tissue in accordance with one embodiment of the present disclosure.

FIG. **4** is an exemplary illustration of an entire gastric sleeve **300** with surgical clips, such as surgical clips **100**, **200** of FIG. **1** and FIG. **2**, for example, employed to fasten open edges **302** of stomach tissue together in accordance with one embodiment of the present disclosure.

As shown in FIG. **4**, surgical clips **100**, **200** are installed in the engaged position such that curved backbone **102**, **202** encloses the open edges **302** of the stomach tissue and arms **104**, **204** extend substantially perpendicular to the backbone **102**, **202** to cover several rows of surgical staples **350**. The surgical clips **100**, **200** reinforce the closure formed by the stapled edge **320** of the gastric sleeve **300** to fasten the gastric sleeve **300**.

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In an embodiment, the quantity of surgical clips **100**, **200**, and the dimensions of surgical clips **100**, **200**, are selected to provide sufficient coverage of the open edge **302** of stomach tissue to inhibit the development of holes and gaps along the stapled edge **320** of the gastric sleeve **300** and substantially prevent leakage of gastric fluid from the gastric sleeve **300** into the abdominal cavity.

In various embodiments, the surgical clips **100**, **200** may be positioned in a side-by-side orientation across the open edges **302** of the stomach tissue, or the surgical clips **100**, **200** may be spaced apart by a distance ranging from about 0 mm to about 4 mm.

In an embodiment, where a plurality of rows of surgical staples **350** forms the stapled edge **320** of gastric sleeve **300**, the arms **104**, **204** of surgical clips **100**, **200** may extend to a depth (d) covering at least three rows of staples **350**.

FIG. **5a** is an exemplary illustration of a surgical clip applicator **500** that may be used during laparoscopic gastric sleeve surgery to deploy the crimpable surgical clip **100** of FIG. **1** to the engaged position shown in FIG. **3b** and FIG. **4** to fasten the gastric sleeve **300** in accordance with one embodiment of the present disclosure. FIG. **5b** is an enlarged view of the clip delivery end **510** of the surgical clip applicator **500**.

In one embodiment, the surgical clip applicator **500** comprises an applicator handle **502** with an applicator actuator **504**, a trocar **506**, a clip delivery end **510** having a stationary axis **512**, and jaws **508**. During surgery, the surgeon inserts the jaws **508**, the clip delivery end **510** and at least part of the trocar **506** through a laparoscopic port into the abdominal cavity of a patient's body to install the surgical clip **100**. Crimpable surgical clips **100** are loaded through the applicator handle **502** into the trocar **506**, and a single surgical clip **100** is conveyed through the stationary axis **512** of the clip delivery end **510** to the jaws **508**. The surgeon may then orient the surgical clip **100** to a position substantially perpendicular to the open edges **302** of the stapled edge **320** of the gastric sleeve **300** for installation by articulating the entire surgical clip applicator **500** to the appropriate orientation. Once the disengaged surgical clip **100** is properly oriented, the surgeon may then pull the applicator actuator **504** to cause the jaws **508** to apply an inward, closing force against the surgical clip **100**. The jaws thereby crimp the surgical clip **100** into the engaged position shown in FIG. **3b** and FIG. **4**. Then the jaws **508** open again for loading of another surgical clip **100**.

A similar surgical clip applicator may be used to deploy the spring memory surgical clip **200** of FIG. **2** in accordance with one embodiment of the present disclosure. In an embodiment, the jaws of such a surgical clip applicator would be configured to initially force the arms **204** of the spring memory surgical clip **200** apart.

The surgeon may then position the surgical clip **200** substantially perpendicular to the open edges **302** of the stapled edge **320** of the gastric sleeve **300** for installation by articulating the entire surgical clip applicator to the appropriate orientation. Once the surgical clip **200** is properly oriented, the surgeon may then pull the applicator actuator **504** to cause the jaws **508** to release the arms **204** of the surgical clip **100**. Once released, the arms **204** of the surgical clip **200** will respond to the spring memory force by closing to the engaged position shown in FIG. **4**.

FIG. **6a** is an exemplary illustration of a surgical clip applicator **600** that may be used during laparoscopic gastric sleeve surgery to deploy the crimpable surgical clip **100** of FIG. **1** to the engaged position shown in FIG. **3b** and FIG. **4** to fasten the gastric sleeve **300** in accordance with one embodiment of the present disclosure. FIG. **6b** is an enlarged view of the clip delivery end **610** of the surgical clip applicator **600**.

In one embodiment, surgical clip applier **600** could generally be similar to surgical clip applier **500** shown in and described in conjunction with FIGS. **5a** and **5b** above (with like parts having similar numbers), except that surgical clip applier **600** comprises a rotatable axis **612** on the clip delivery end **610**. As such, surgical clip applier **600** comprises an applier handle **602** with an applier actuator **604**, a trocar **606**, a clip delivery end **610** having a rotatable axis **512**, and jaws **608**.

During surgery, the surgeon inserts the jaws **608**, the clip delivery end **610** and at least part of the trocar **606** through a laparoscopic port into the abdominal cavity of a patient's body to install the surgical clip **100**. Crimpable surgical clips **100** are loaded through the applier handle **602** into the trocar **606**, and a single clip **100** is conveyed through the clip delivery end **610** to the jaws **608**. During loading of surgical clip **100** into jaws **608**, the rotatable axis **612** is aligned with the trocar **606**.

In various embodiments, the surgeon may position the surgical clip **100** substantially perpendicular to the open edges **302** of the stapled edge **320** of the gastric sleeve **300** for installation by articulating the entire surgical clip applier **600** to the appropriate orientation with the rotatable axis **612** aligned with the trocar **606**. Alternatively, or in combination with articulating the entire surgical clip applier **600**, the surgeon may engage controls on the applier actuator **604** to articulate the rotatable axis **612** of the clip delivery end **610** to the desired orientation. Once the disengaged surgical clip **100** is properly oriented, the surgeon may pull the applier actuator **604** to cause the jaws **608** to apply an inward, closing force against the surgical clip **100**. The jaws **608** thereby crimp the surgical clip **100** into the engaged position shown in FIG. **3b** and FIG. **4** before the jaws **608** open again and the rotatable axis **612** is aligned with the trocar **606** for loading of another surgical clip **100**.

A similar surgical clip applier may be used to deploy the spring memory surgical clip **200** of FIG. **2** in accordance with one embodiment of the present disclosure. In an embodiment, the jaws of such a surgical clip applier would be configured to initially force the arms **204** of the spring memory surgical clip **200** apart.

The surgeon may then position the surgical clip **200** substantially perpendicular to the open edges **302** of the stapled edge **320** of the gastric sleeve **300** for installation by articulating the entire surgical clip applier **600** to the appropriate orientation with the rotatable axis **612** aligned with the trocar **606**. Alternatively, or in combination with articulating the entire surgical clip applier **600**, the surgeon may engage controls on the applier actuator **604** to articulate the rotatable axis **612** of the clip delivery end **610** to the desired orientation.

Once the surgical clip **200** is properly oriented, the surgeon may then pull the applier actuator **604**, thereby causing the jaws **608** to release the arms **204** of the surgical clip **200**. Once released, the arms **204** of the surgical clip **200** will respond to the spring memory force by closing to the engaged position shown in FIG. **4**.

It may be advantageous to set forth definitions of certain words and phrases used in this patent document. The term "couple" and its derivatives refer to any direct or indirect communication between two or more elements, whether or not those elements are in physical contact with one another. The terms "include" and "comprise," as well as derivatives thereof, mean inclusion without limitation. The term "or" is inclusive, meaning and/or. The phrases "associated with" and "associated therewith," as well as derivatives thereof, may mean to include, be included within, interconnect with, contain, be contained within, connect to or with, couple to or

with, be communicable with, cooperate with, interleave, juxtapose, be proximate to, be bound to or with, have, have a property of, or the like.

While this disclosure has described certain embodiments and generally associated methods, alterations and permutations of these embodiments and methods will be apparent to those skilled in the art. Accordingly, the above description of example embodiments does not define or constrain this disclosure. Other changes, substitutions, and alterations are also possible without departing from the spirit and scope of this disclosure, as defined by the following claims.

What is claimed is:

1. A surgical clip comprising:

a curved backbone having a lower side;

a plurality of arms coupled to the curved backbone and extending perpendicular therefrom in the same direction, each arm having a facing side;

an interior surface comprising the lower side of the curved backbone and the facing sides of the plurality of arms;

a plurality of grippable prongs disposed along the facing sides of the plurality of arms on the interior surface; and wherein each of the plurality of arms is spring loaded and biased in a closed position.

2. The surgical clip of claim 1, further comprising reinforced adhesive material disposed along the interior surface.

3. A method of installing the surgical clip of claim 1, the method comprising: providing the surgical clip of claim 1

forcing open the spring loaded arms;

positioning the surgical clip along a stapled edge of body tissue; and

releasing the spring loaded arms to engage and secure the stapled edge of body tissue.

4. The method of claim 3, further comprising:

gripping the body tissue forming the stapled edge with the grippable prongs disposed along the interior surface of the surgical clip.

5. A system for installing the surgical clip of claim 1, the system comprising the surgical clip of claim 1 and a tool comprising:

a clip delivery end to carry and position the surgical clip; and

an actuator to cause the surgical clip to engage and secure the stapled edge of body tissue; wherein the actuator releases the clip to a closed position.

6. The system of claim 5, wherein the actuator causes the clip to be crimped.

7. The system of claim 5, further comprising:

a handle;

a trocar coupled to the handle and coupled to the clip delivery end; and

jaws coupled to the clip delivery end; wherein a plurality of surgical clips are loaded through the handle into the trocar, and a surgical clip is conveyed through the clip delivery end to the jaws.

8. The system of claim 7, wherein the clip delivery end has a stationary axis.

9. The system of claim 7, wherein the clip delivery end has a rotatable axis.

10. A method of installing a surgical clip, the method comprising:

fastening body tissue with surgical staples to form a stapled edge; and

fastening the surgical clip across the stapled edge to inhibit the development of openings along the stapled edge, the surgical clip comprising:

a curved backbone having a lower side;

a plurality of arms coupled to the curved backbone and extending therefrom in the same direction, each arm having a facing side; and

an interior surface comprising the lower side of the curved backbone and the facing sides of the plurality of arms wherein the surgical clip is positioned perpendicular to the stapled edge. 5

11. The method of claim **10**, further comprising: positioning the curved backbone around open edges of body tissue along the stapled edge before fastening the surgical clip across the stapled edge. 10

12. The method of claim **11**, further comprising: extending the plurality of arms over one or more rows of surgical staples forming the stapled edge before fastening the surgical clip across the stapled edge. 15

13. The method of claim **10**, further comprising gripping the body tissue forming the stapled edge with grippable prongs disposed along an interior surface of the surgical clip.

14. The method of claim **10**, further comprising adhering the surgical clip to the stapled edge. 20

15. The method of claim **10**, the method further comprising:

engaging the stapled edge of body tissue with the plurality of arms; and

crimping the surgical clip to secure the stapled edge of body tissue. 25

16. The method of claim **15**, further comprising: gripping the body tissue forming the stapled edge with grippable prongs disposed along an interior surface of the surgical clip. 30

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